Cost of solar energy generated using PV panels

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Abstract: This paper utilizes monthly average daily global solar radiation and sunshine duration data to study the distribution of radiation and sunshine duration over Saudi Arabia. The analysis also includes the renewable energy production and economical evaluation of a 5 MW installed capacity photovoltaic based grid connected power plant for electricity generation. The study utilizes RetScreen software for energy production and economical assessment. It is found that the global solar radiation varies between a minimum of 1.63 MWh/m2 yr-1 at Tabuk and a maximum of 2.56 MWh/m2 yr-1 at Bisha while the mean remained as 2.06 MWh/m2 yr-1. The duration of sunshine varied between 7.4 and 9.4 h with an overall mean of 8.89 h. The specific yield was found to vary from 211.5 to 319.0 kWh/m2 with a mean of 260.83 kWh/m2. The renewable energy produced each year from 5 MWp installed capacity plant was varied between 8196 and 12,360 MWh while the mean remained as 10,077 MWh/yr-1. The economical indicators like internal rate of return, the simple payback period, the years to positive cash flows, the net present value, the annual life cycle savings, the profitability index and the cost of renewable energy production showed that Bishah was the best site for PV based power plant development and Tabuk the worst. From environmental point of view, it was found that on an average an approximate quantity of 8182 ton of green house gases can be avoided entering into the local atmosphere each year.